cycles

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FOUNDATION FOR THE STUDY OF CYCLES
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CONTENTS

Page

THE DIRECTOR'S LETTER 263

RESEARCH

The 8.17-Year Cycle in Common Stock Prices 265

My Stock Market Forecast of 1944 With The 9.2 and the 8.17-Year Cycles Revised 268

THE 6¼-HOUR CYCLE OF WILDLIFE ACTIVITY 269

THE CYCLOPAEDIA OF CYCLES, PAGE 1, by Catherine Herzel 270

THE 1956 POSTSCRIPT TO *CYCLES—THE SCIENCE OF PREDICTION*

Part IX: The 8-Year Cycle 271

HOW IT CAME OUT

The 8-Year Cycle in Cigarette Production, 1880—1955 275

The 8-Year Cycle in Goodyear Tire & Rubber Company Sales, 1926—1955 278

LETTERS 280

THE MODIFIED GEISINGER INDICATOR OF INDUSTRIAL PRODUCTION 282

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cycles

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THE DIRECTOR'S LETTER

Dear Member:

Every once in a while some member writes me to say, "I'd get more out of your reports if I knew just what you did."

What We Do

What we do is the simplest thing in the world. We start with a string of figures. When necessary we adjust for long term growth. We find the perfectly regular pattern that comes closest to all the figures, after the effect of growth has been removed. And then, finally, we pass judgment as to whether or not the correspondence between the regular cycle and these figures is close enough to mean anything. It's as simple as that!

How we find the perfectly regular cycle is entirely unimportant. Call it trial and error if you like. There is no magic about it. Just a little work. The important thing is the degree of correspondence between the actual figures (or the actual figures adjusted for growth) and the regular cycle, and the number of times the cycle repeats.

Let's look at it another way: Almost everything goes up and down—prices, production, temperature, disease, the number of earthquakes, the abundance of animals, what you will. Something makes them go up. Then, either something comes along to make them go down, or they go up too far and fall of their own weight. A natural assumption is that these "somethings" occur at *random* time intervals. Even so, just by chance, some of them will be spaced at reasonably regular time intervals. However, by chance alone, you are not likely to have any large number of random events come at reasonably regular time intervals. Ergo, if a large number of events do come at reasonably regular time intervals their timing is probably not random.

Now, from the standpoint of cycle study, the crux of the matter is this: In any given instance, are the regularities we observe too regular to be easily the result of chance? This is determined by comparing the actual behavior with some perfectly regular pattern set up for comparison. The actual behavior will conform only in a general way, of course, because there will be many randoms. The thing to look for, as explained in the January 1956 report, are *areas* of highs, *areas* of lows—alternating with reasonable regularity. Do these areas conform *enough* times and with *enough* fit to the regular pattern? If they do there is probably some cause for the regularity.

I raise this point to make it clear to you that it is unimportant where the pattern comes from or how it was hit upon. You don't need to understand that part of it at all in order to evaluate the result.

How to Find the Cycle

However, as I have brought the subject up, I might as well tell you how to find the cycle. You merely try every possible cycle length of every possible wave shape and strength at every possible position (timing) to get the pattern that fits best. By "fits best" we mean "differs least from" the all figures you started with, or these figures less growth trend and demonstrably random distortions. Whether called "simple inspection" or by some high falutin name like "multiple harmonic analysis" it all boils down to the same thing--trial and error. There are however a lot of short cuts. The art of cycle analysis consists largely of knowing about these so as to reduce the amount of work to practical proportions.

Our Research Program

It may interest you to know a little more about our research program.

All our research work is now carried on in a small hide-away office in Pittsburgh. In it we do nothing but research--we do not have even a telephone to interrupt us. The office is in charge of Miss Gertrude Shirk, a very competent young woman. She is responsible for all the figure work and all the charts printed in *Cycles* and in the *Journal of Cycle Research.* I get down from East Brady to Pittsburgh about twice a week. I'd go oftener but it's 120 miles round trip and takes nearly four hours of driving each time.

Our research work consists of four parts: One, the audit of my stock market work of 1944. Two, development of new techniques for cycle analysis and for the evaluation of cycles. Three, research to round out and make possible the Postscript. Four, general research and the work needed to prepare material for the "How It Done Do" Department, and so on.

The Stock Market Research Audit

The stock market research audit is coming on very well. I have already reported to you upon the audit of the 9.18- and 8.17-year cycles in the combined stock index. In the next issue I hope to tell you about the 8.17-year cycle in rail stock prices. As you know, rail stock prices go back for 40 additional years. The longer span of time enables us to see that the 8.17-year cycle is really a compound of cycles about 7.95 years and 8.35 years long (we'll have the exact length for the November report). The reason we have to bother with rails is that, being so much longer, and having many of the same cycles in common, they enable us to do much better work on the combined series.

I'm eager to get at the audit of the 12-year cycle in stock market figures, but I need to audit the 8 1/6-year cycle first as it interferes with the 12. You see, three 8-year cycles and two 12-year cycles come together every 24-years and then interfere with each other.

We'll probably start to work on the 12-year cycle as soon as we finish with the 8- and 9-year cycles in rails. The revised 12-year may make some important differences in the synthesis and projection.

New Techniques

An important part of our work is the development of new techniques of cycle analysis. I plan to publish some of our results in the October 1956 *Journal of Cycle Research.* If you are interested in technical matters you may want to get a copy. (Price $1.00). You may even want to subscribe to the *Journal.* ($4.00 a year.)

The Postscript

As you realize, the Postscript is really a book in itself. It is something like *Cycles--The Science of Prediction* which Mr. Dakin and I wrote in 1944 (Now out of print, so don't write in for a copy). However, the Postscript is much more detailed. A great deal of additional material has been gathered together during the past twelve years. For instance, I doubt if the eight-year cycle was even mentioned in *Cycles--The Science of Prediction:* the current chapter of the Postscript lists 16 examples of this important rhythm. Quite a bit of our research effort is spent in getting facts to round out this postscript presentation.

General Research

Finally, the fourth aspect of our research program has to do with general research: Cycles in the sales or production of various companies, in war, in disease, in earthquakes--in fact cycles in everything under the sun and in the sun itself to Boot! The more of these we can find and record the sooner they will have a chance to keep on coming true; the firmer will be our foundation of fact upon which to build a science of cycles.

Cordially yours,

Ned Dewey

Edward R. Dewey

THE 8.17 YEAR CYCLE
IN
COMMON STOCK PRICES

A RESTUDY of the so-called 8 1/6-year cycle, as found in the Standard & Poor's Corporation Combined Stock Price Index (480 stocks), has just been completed. The figures studied covered the period 1871 through 1955.

Characteristics

The presence of a cycle of this length in these figures was confirmed. The cycle was found to have the following characteristics: **Length**, 8.17 years. **Timing**, current crest 1954.16. **Strength**, 4.7% above trend at ideal time of crest, 4.5% below trend at ideal time of trough.

Obviously this cycle is past its crest and is exerting less upward pressure than it did a year and a half ago. Equally obvious is the fact that even at best this cycle is quite weak. Prices on Feb. 6, 1954 the date of the last crest of the ideal cycle, were only 4.7% higher than they would have been if this cycle had not existed. At the present time they are only 1% higher.

No Change in Length

The present study makes no change in the length of the cycle from that determined previously. It advances the timing by about a month. However, it cuts down the strength at ideal time of crest by about 42%. The old amplitude was 8.2%; the new amplitude is 4.7%.

The difference in amplitude is not because of any error in the earlier work. At that time I generally used the *average* strength of a cycle. Now I generally cut down exceptionally high and exceptionally low values to get a more representative or typical value. For example, the effect of a huge peak like that of 1929 should not ordinarily be averaged in at full strength.

I have revised my stock market projection of 1944 to include the new values of the 8.17-year cycle. (See page 268.)

The actual work of isolating the 8.17-year cycle is shown on the double page chart overleaf on pages 266 and 267.

The Chart

Curve A shows the actual index values.

Curve B shows, by means of a broken line, their 9-year moving average trend. A 9-year moving average trend is merely a series of overlapping 9-year averages. Thus the values 1871 through 1879 (nine years) are averaged to get the trend value for 1875; the values 1872 through 1880 are averaged to get the trend value for 1876; and so on. Obviously the first four and last four values of such a trend must be estimated.

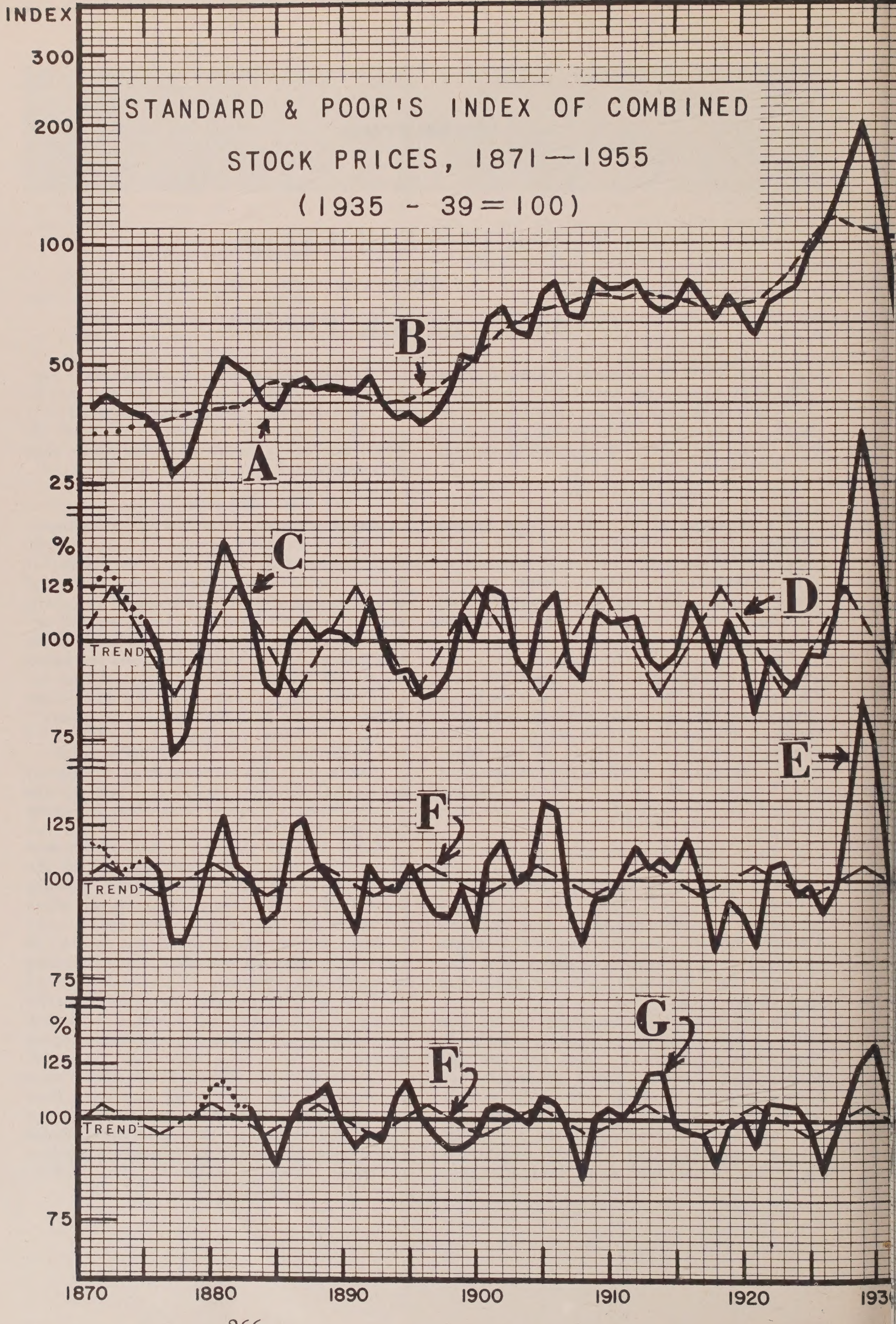
Curve C shows how Curve A would look if the trend, Curve B, were pulled straight.

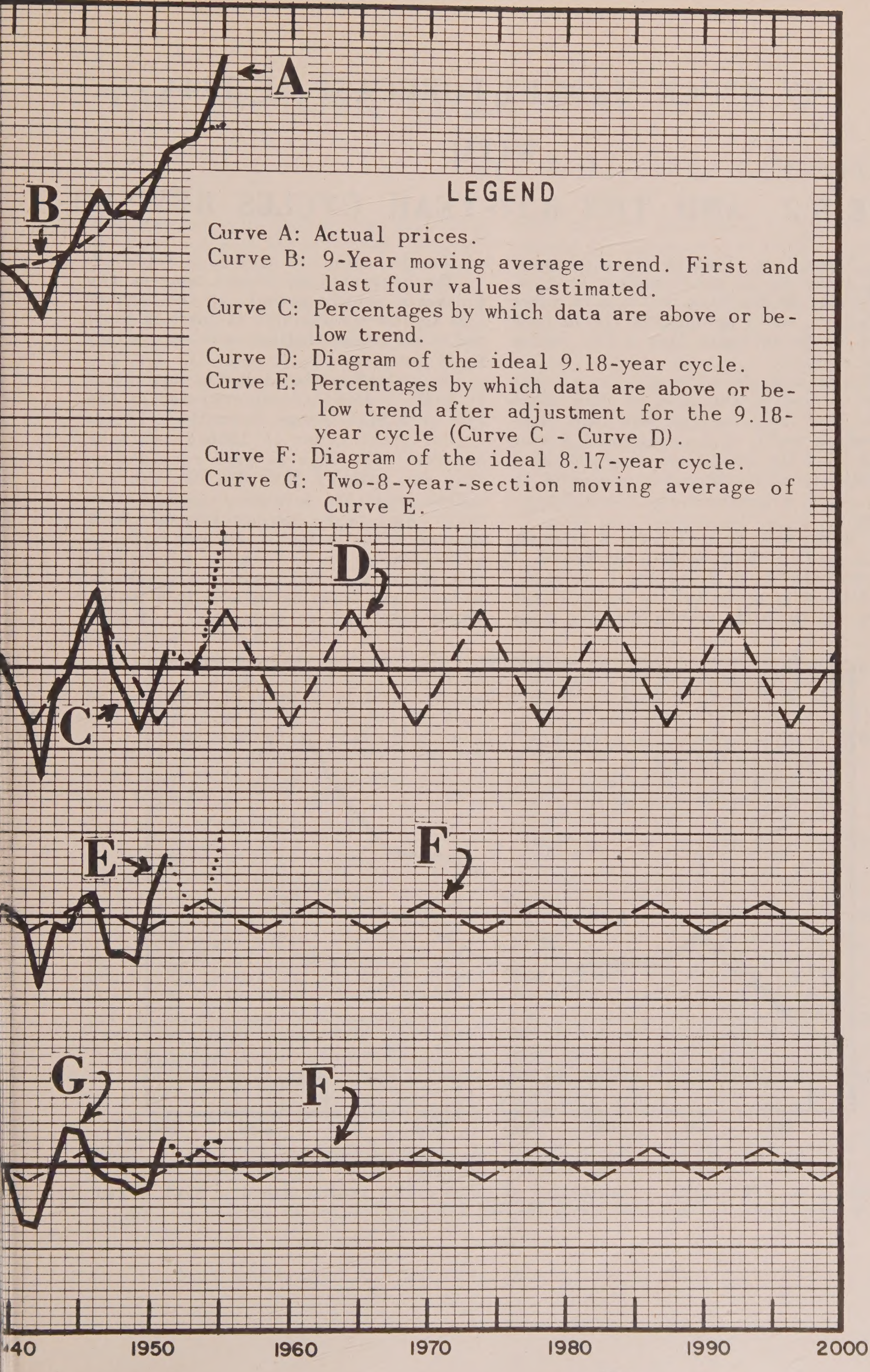
Curve D diagrams the ideal 9.18-year cycle with uniform amplitude. This is the cycle reported upon in *Cycles* for June 1956 and July 1956.

Curve E shows the percentages which were plotted as Curve C after adjustment for the 9.18-year cycle. Curve E is Curve C minus Curve D. Removing the 9.18-year cycle makes it easier to see the 8.17-year cycle.

Curve F diagrams the 8.17-year cycle. It is fairly easy to see that the alternate strength and weakness of Curve E tend to conform to this regular pattern. Careful study of all values of Curve E show the typical cycle to have the characteristics shown.

Curve G shows Curve E smoothed by a two-8-year-section moving average. That is, every two consecutive cycles are overlapped and averaged. This procedure has no effect upon the cycle but minimizes randoms and makes the cycle easier to see. *E.R.D.*


STANDARD & POOR'S INDEX OF COMBINED
STOCK PRICES, 1871—1955
(1935 - 39=100)
INDEX
300
200
100
50
25
%
125
100
75
125
100
75
%
125
100
75
TREND
TREND
TREND
A
B
C
D
E
F
F
G
1870
1880
1890
1900
1910
1920
193



LEGEND

Curve A: Actual prices.
Curve B: 9-Year moving average trend. First and last four values estimated.
Curve C: Percentages by which data are above or below trend.
Curve D: Diagram of the ideal 9.18-year cycle.
Curve E: Percentages by which data are above or below trend after adjustment for the 9.18-year cycle (Curve C - Curve D).
Curve F: Diagram of the ideal 8.17-year cycle.
Curve G: Two-8-year-section moving average of Curve E.

MY STOCK MARKET FORECAST OF 1944
WITH
THE 9.2 AND THE 8.17-YEAR CYCLES REVISED

As you know, I am in the process of auditing my stock market work of 1944. We now have twelve more years of figures and I now know a little more about cycle analysis than I did twelve yeare ago.

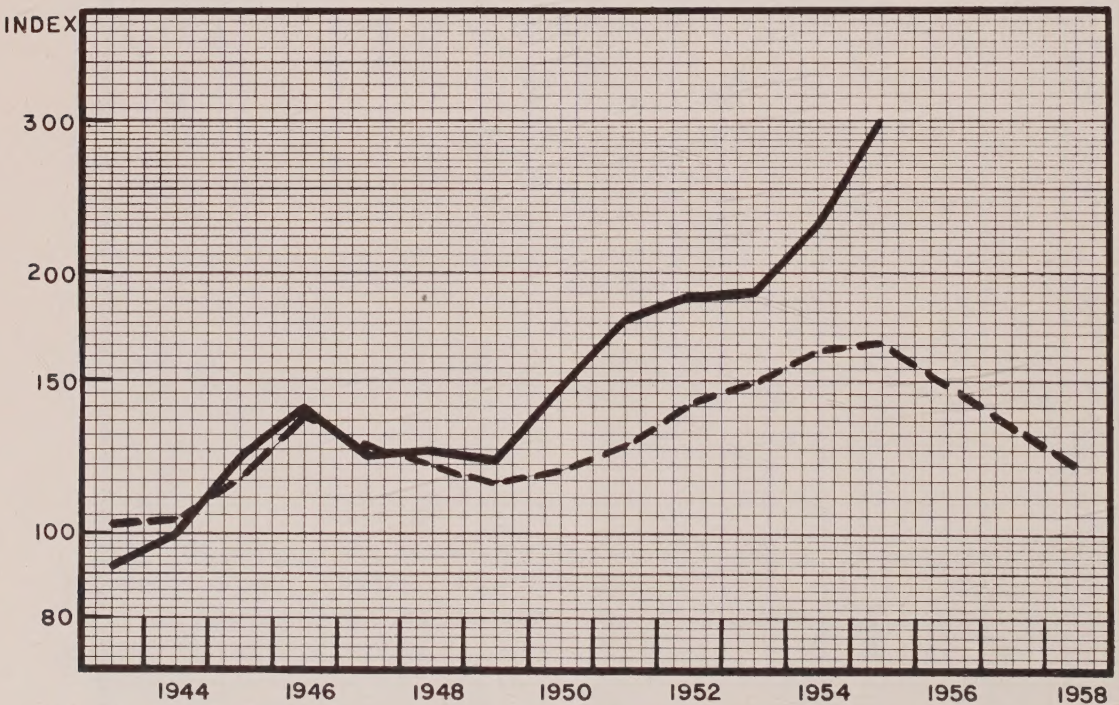
I published the first results of this audit in *Cycles* for June of 1956. That issue, and the issue for July 1956, discussed the audit of the original 9.2-year cycle. The July 1956 issue also published a synthesis of the 10 cycles projected in 1944, with new values for the 9.2-year cycle.

I am now able to revise the 8 1/6-year cycle used in the original synthesis. A new synthesis is given below. It uses the new 8 1/6-year cycle and the new 9.2-year cycle. All the eight other cycles are still on the old basis.

The disparity of levels between the synthesis and the actuals at the present time is almost certainly, at least in part, due to inflation. Inflation is not cyclic, it is perennial!

The revised synthesis continues to crest in 1955. I doubt if any revision of the 1944 work will change it to 1956. If the actual crest comes in 1956 it will be one year off. This is good considering that the work of 1944 did not use any cycles less than 4 years in length. You cannot hope to be too precise when your shortest cycle is four years long.

The purpose of this work is not to provide information for trading purposes. It is to supply broad background information not available in any other way. *E.R.D.*



Solid line, 1943—1955, Standard & Poor's Corporation Combined Stock Price Index (1935-39 = 100) as this index actually unfolded.

Broken line, 1943—1958, a combination of eight cycles as determined in 1944, trend as determined in 1939, and the 9.18- and 8.17-year cycles as revised in 1956.

THE 6¼—HOUR CYCLE OF WILDLIFE ACTIVITY

IF you are a fisherman you doubtless already know of the so-called "Solunar" Tables published and sold (75¢) each year by John Alden Knight of Williamsport, Pa. These tables tell you for each part of The United States for each day of the year the times, other things being equal, when the fish are most likely to bite. These tables are acclaimed by hundreds—perhaps thousands—of fishermen. Everyone with whom I have discussed the matter states that they "work."

Four Activity Periods

According to Knight, the 24 hours and fifty-odd minutes that comprise the "day" of a fish are divided into four periods of activity and four periods of rest. The four activity periods last from an hour and a half to two hours or more and are the times for that particular day, *other things being equal,* when the fish bite best.

These activity periods are the same for any latitude, but change with longitude as the earth rotates. Two of these four activity periods are major, and occur when the combined gravitational pull of the sun and the moon are directly exerted; two are minor and occur when this force is exerted at a tangent.

Tables Simple

The tables are very simple. They give the starting time of each of these activity periods in local Standard Time. They give an adaptation table for various locations (for example "California, Southern part," or "Pennsylvania, Western part") so that you can add or subtract the proper number of minutes to get more correctly the hour and the minute fot whatever part of the time zone you may happen to be in.

Knight says that the tables "work" not only for fresh and for salt water fish but for birds and for game as well. He goes on to say that activity periods of domestic animals such as horses, cows, sheep, and dogs follow the Solunar schedule nearly as well as do the creatures of the wild. He even alleges that human beings are more active and responsive at Solunar activity periods. Only, he says, because our senses have been dulled by centuries of comparative disuse, the activity of human beings shows a lag of about an hour in comparison with activity periods of wild animals. Finally Knight says that careful counts show that even plants respond to these forces and that more buds will burst to full bloom then than at other times.

I do not know whether or not these findings have been verified by scientists, but in view of what sportsmen tell me about the usefulness of these tables, I should think it would be a subject well worth scientific inquiry.

I do not mean to give the impression that Knight claims the world and all for his tables; Quite the contrary. He says that the trend of the barometer is usually much more important than the Solunar forces. Wind and temperature are important too. And then of course there is the regular 24-hour cycle of wildlife activity.

All Knight says is that, *other things being equal*, on any given day your chances are better during the Solunar periods than at the rest periods in between.

If you are a sportsman or are interested in watching things of this sort, I would suggest that you send him your 75¢ and observe for yourself whether or not these things are true. Also there are 100 or more newspapers that carry the Solunar tables as a syndicated feature on their sports pages. Papers like the New York Herald Tribune, the Cleveland Plain Dealer, the Baltimore Sun, the St. Louis Globe Democrat, etc., etc. If your paper carries the tables you can save your 75¢.

It has doubtless occurred to you, as it has to me, to wonder whether or not there is any correspondence between these Solunar periods and *trading* activity. If bass and pike bite at these times suckers might also! It would be interesting to investigate. Let me know what you find out.

E.R.D.

THE CYCLOPAEDIA OF CYCLES, Page 1

by Catherine Herzel

Mammals

CATTLE, birth of, tidal cycle in, on coast of the North Sea and in Holland, "Births take place chiefly with the incoming tide."
Schultz, J., 1941, 1, p. 25.

COYOTE (Canis latrans), slightly less than 10-year cycle in abundance of, in Canada. Data from Canadian fur returns.
Elton, Charles and Nicholson, Mary, 1942, 1, p. 96.

FISHER, 10-year cycle in abundance of. "Particularly good statistics are available for the fisher, and these show that its cycle has run parallel to that of the varying hare, but in an opposite sense. Thus, while rabbits were at a peak in the east of Canada in 1904 and 1905, the fishers were at their peak several years earlier, 1898 and 1899. This general relationship has been preserved for the last sixty years at least."
Elton, Charles, 1, 1929, p. 7.

FOX, COLOURED (Vulpes fulva, etc.), slightly less than 10-year cycle in abundance of, in Canada. Data from Canadian fur returns.
Elton, Charles and Nicholson, Mary, 1942, 1, p. 96.

LEMMINGS, 3- or 4-year cycle in onset of migration and hence of overpopulation. Lemming years in 1918, 1922, 1926. This cycle ran "practically parallel for a number of years" with cycle of the rype or willow grouse.
Kloster, 1921, 1, as quoted by Elton, Charles, 1929, 1, p. 5.
Lemmings have the same years of abundance in Ungava Bay and Norway.
Elton, Charles, 1929, 1, p. 8.

VOLES, 3- or 4-year cycle in increase of numbers of, in Norway. The same cycle "whether they live in the alpine regions of the mountain, in the woods, or in the lowlands."
Collett, R., 1912, 1, as quoted by Elton, Charles, 1929, 1, p. 5.

Birds

BIRDS OF PASSAGE follow 11-year periods in their migration.
Schultz, J., 1941, 1, p. 24.

GOSHAWK (Ostur atricapillus), slightly less than 10-year cycle in abundance of, in Canada.
Elton, Charles and Nicholson, Mary, 1942, 1, p. 96.

GROUSE, 10-year cycle in abundance of in Canada, "grouse and snowshoe rabbits in Canada, otherwise unconnected ecologically, have parallel ten-year cycles, though not in the same years."
Elton, Charles, 1929, 1, p. 8.

JAY, 11-year cycle in migration of swarms of, from Asia to Russia to Central Europe at time of the sunspot maxima.
Schultz, J., 1941, 1, p. 24.

OWL, GREAT HORNED (Bubo Virgininianus), slightly less than 10-year cycle in abundance of, in Canada.
Elton, Charles and Nicholson, Mary, 1942, 1, p. 96.

PRAIRIE CHICKEN, 10-year cycle in abundance of.
Elton, Charles, 1933, 1, p. 84.

SANDGROUSE, 22-year cycle in irruption of from Central Asia.
Elton, Charles, 1929, 1, p. 8.

Birds Continued

SIBERIA PRAIRIE HEN, 11-year cycle in migration of. (see JAY.)
Schultz, J., 1941, 1, p. 24.

WILLOW GROUSE or rype, 3- or 4-year cycle in abundance of. This cycle and the lemming cycle "ran practically parallel for a number of years."
Kloster, 1921, 1, as quoted by Elton, Charles, 1929, 1, p. 5.

Insects

COCKCHAFER, 3- or 4-year cycle in outbursts of. Details of periodicity vary, in different parts of Europe, but in any one place may be extraordinarily constant. For example, exactly every 3 years for the last sixty years in certain parts of Europe.
Decoppet, M., 1920, 1, as quoted by Elton, Charles, 1929, 1, p. 4.

INSECT PESTS, 11-year cycle of epidemics of. Reports of 1800-1825 show "pest epidemics recur every 11 or 12 years..... show definite conformity with sunspot maxima."
Schultz, J., 1941, 1, p. 24.

Fish

SALMON, slightly less than 10-year cycle in abundance of, in Canada, Restigouche River, New Brunswick, Canada, salmon catch analyzed by Phelps and Belding (1931, 1). Study of salmon age-class distribution shows controlling source in marine or estuarine life of fish, not river. Peak years 1885-6, 1895, 1905-6, 1917, 1924-5.
Elton, Charles and Nicholson, Mary, 1942, 1, p. 124.

Other Animals

CRUSTACEA (certain), lunar cycle in change of shell.
Schultz, J., 1941, 1, p. 25.

ORGANISMS CAUSING DISEASE OF MICE AND LEMMINGS, 3- or 4-year cycle in, in Scandinavia. Disease attacks mice and lemmings when they reach a peak in numbers The organisms causing the disease are not the same as those which attack the rype or willow grouse at the same time.
Elton, Charles, 1929, 1, p. 5.

ORGANISMS CAUSING DISEASE OF RYPE OR WILLOW GROUSE, 3- or 4-year cycle in, in Scandinavia. Disease attacks rype or willow grouse when they reach a peak in numbers. The organisms causing the disease are not the same as those which attack the mice and lemmings at the same time.
Elton, Charles, 1929, 1, p. 5.

PALOLO-WORM, annual-lunar cycle in, ".....the Palolo-Worm of the South Seas comes to the surface of the water to swarm in the same month each year and during the same moon phase. The Polynesian species appears in the night prior to the last quarter of the moon, in October or November, and the species of the North Atlantic acts likewise at the end of June or the beginning of July."
Schultz, J., 1941, 1, p. 25.

SEA-URCHINS (particular kind of the Red Sea), lunar cycle of spawning. "spawns only when the moon is full."
Schultz, J., 1, 1941, p. 25.

Weather

SNOW, possible 3- or 4-year cycle in amount of lying on ground in Scandinavia. (Strong indication that cycles in numbers of lemmings and mice in Scandinavia related to cycles of amount of snow on ground, but data lacking.)
Elton, Charles, 1929, 1, pp. 5-6.

The Earth

TIMBER SAP, lunar cycle in amount of, in the tropics. "...timber felled at the time of waxing moon is too full of sap and invites the death watch beetle so that it is more quickly eaten away. In South America and on the South Sea Islands contracts frequently stipulate that wood is to be cut only when the moon is waning."
Schultz, J., 1941, 1, p. 24.

Disease

PLAGUE, periodic outbreaks of in South Africa and the Volga. "Every few years there are outbreaks of endemic plague caused by the periodic epidemics of wild rodents."
Elton, Charles, 1929, 1, p. 7.

DISEASE of snowshoe rabbits, 10-year cycle in increase of, "occurs at time of abundance of...rabbits..." Disease the result of cycle rather than the cause. "Evidence in the support of this idea is found in the occurrence of epidemics...at other points in the cycle of abundance." Also, theory of disease as cause does not explain parallel rise and fall of cycle in different parts of Canada, thousands of miles apart, nor existence of same 10-year cycle in other species.
Elton, Charles, 1933, 1, p. 84.

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THE 1956 POSTSCRIPT
TO
CYCLES—THE SCIENCE OF PREDICTION

PART IX: THE 8-YEAR CYCLE

"YOU are going to tell me about the eight-year cycle." said Robert Steele as we resumed our weekly discussion of cycles.

"Well," I replied, "what is generally known as the 8-year cycle seems to have a length just a little less than 8 years. As best I have been able to measure it, it is 7.95 years long."

"Where do you find it?"

In Cigarette Production

"We find hints of it in a number of places, but so far it is best substantiated in cigarette production."

"Why do you say that?"

"For three reasons: First in cigarette production it is quite regular; second, in these figures it has repeated *as a rhythm* over nine times, and third, in these figures it has kept on coming true for almost one complete cycle since discovery."

"Have you a chart of it?"

"Yes. Here is a chart showing cigarette production, 1880—1955. [See page 276.] This chart also shows the underlying growth trend. And here is another chart showing percentages above and below the growth trend [See page 277.] The second chart diagrams the eight-year cycle and shows how it has unfolded since discovery. It is very regular. Wave, wave, wave, wave, wave, wave, wave, wave, wave, nine times right across the page."

"Where else do you find it besides in cigarettes?" asked Robert.

In Goodyear Tire & Rubber Co. Sales

"Another place is Goodyear Tire & Rubber Company net sales. However, Goodyear figures go back only to 1926 and so we have only four waves."

"Do cigarettes and Goodyear waves come at the same time?"

"Just about. The 8-year pattern that best fits cigarettes crests at 1952.5. The 8-year pattern that best fits Goodyear crests at 1952.75, three months later."

"Where else do you find it?"

In A Dozen Other Phenomena

"There are at least hints of it in the sales of another manufacturing company, in weather, in lynx abundance, in pig iron prices, in cotton prices, in rail stock prices, in sunspots with alternate cycles reversed, in crop yields, in steel ingot production, in wheat prices, and in the price of eggs."

"Gracious!" said Robert. "It seems to be pretty well substantiated."

"I wouldn't say that." I answered. "I'm not at all sure that it is present in all the places where people think they have seen it. And even when it really is there, it may be there just as a result of chance. We need to do a lot of work on this cycle before we can be completely sure of it. However, we have made a pretty good start."

"Is the length the same in all these series of figures?"

"In the shorter series it is generally

called 8 years, but in the longer series, where it can be measured more exactly, it turns out to be 7.95 years. I think 7.95 years is approximately the true length."

"Do all these 8-year cycles have the same timing?"

Crests Tend to Bunch

"Yes, substantially. Current crests range from 1951.25 to 1954.5. In other words all the crests fall within about a year and a half one way or the other from typical timing, which is 1952.9. That is one of the reasons for thinking the cycle is significant. If this behavior were random the different cycles would crest anywhere. They wouldn't be likely to bunch."

"Do you have the timing of all the different cycles?"

"Yes, as best it is known at the present time. Here is a table that gives you the timing of each of the sixteen 8-year cycles that I know about. It also gives other facts about them." [See below]

"Looking at the table I see that lynx abundance comes earliest of all--1951.25 Isn't that just a little out of step?"

The 7.95-Year Cycle Suggests Latitudinal Passage

"No, lynx isn't out of step if you remember that cycles crest earlier as we find them closer and closer to the poles. The 7.95-year cycle in lynx crests ideally just about where it ought to, and suggests latitudinal passage."

"I take it that when you say 'a 7.95-year cycle crests ideally at such and such a time' you mean that the perfectly regular 7.95-year cycle which bests fits all the figures has a crest at that time."

"Yes." I answered.

"Awhile back you said that where you had only short series of figures the length was put at 8 years--where the series was long enough for accurate measurements it turned out to be 7.95. However, looking at the table I see you have sunspots for 201 years

SUMMARY

8-Year (7.95-Year) Cycle

Ref.	Phenomena	Span of Years	Cycle Length (Preliminary Estimate)	Time of Current Crest	Strength (% above Trend at Crest)
1	Lynx Abundance (Secondary Cycle), 1735--1950	216	7.95	1951.25	22.7%
2	Pig Iron Prices, 1784--1951	168	7.95	1951.5	medium
3	Steel Ingot Production, 1867--1955	89	8.0	1952.0	medium
4	Sunspots with Alternate Cycles Reversed, 1749--1949	201	8.0	1952.3	2.4 index
5	Cigarette Production, 1880--1955	76	7.95	1952.5	6%
6	Goodyear Sales, 1926--1955	30	8.	1952.75	24.4%
7	Rail Stock Prices, 1831--1955	125	*7.95	1952.9	2%
8	Sales of Company G, 1913--1955	43	8.0	1953.25	weak
9	Cotton Prices, 1735--1945	215	7.95	u	strong
10	Rainfall, U. S. A., 1881--1921	41	8.0	1954	medium
11	Rainfall, Ohio, c.1800--c.1900	c.100	8.0	1954	u
12	Average Yield of Chief Crop, 1881--1921	41	8.0	1954	u
13	Abundance of Ptarmigan	u	8	u	u
10	Sauerbeck Index of Wholesale Prices, 1818--1913	96	8.	1954p	u
14	Purchasing Power of Eggs, 1873--1936	64	8.	1954	weak
15	Wheat Prices, Chicago, 1884--1930	47	8.	u	u

u represents unknown. p represents probably c. represents *circa* (about)

*Not to be confused with the 8.17-year cycle in the Combined Stock Index. See text.

down for an 8-year length. Why is that?"

"Anderson of the Bell Telephone Laboratories, who did the work, merely found the strength and timing of a cycle 8.0-years long if there were one of this length present on the average in these figures. He didn't try to find the exact length."

"Is the same thing true of pig iron prices, cotton prices, and railroad stock prices?"

"No, here we tested for various lengths at intervals of about .05 years and found 7.95 years to be the most probable length in this neighborhood."

The 7.95-Year vs. the 8.17-Year Cycle in Stock Prices

"Another thing confuses me. I see you have a 7.95-year cycle down for rail stock prices. If I remember rightly your stock market work of 1944 showed a cycle 8.17-years long. Why the difference?"

"It's quite a long story. My work of 1944 dealt with the *combined* stock price index from 1871 to 1943. The combined stock price index includes rails and industrials and utilities. In the combined index over this period the cycle *is* 8.17 years long. I've just done the work over using figures 1871—1955 and the length remains unchanged at 8.17 years.

"On the other hand," I continued, "if you make a multiple harmonic analysis of *rail* stock prices, 1831—1955, you find evidence of *two* cycles, one 7.95 years long and one 8.36 years long. You'll note that the rail stock price series is 40 years longer than the combined stock price series. This greater length enables us to get a greater separation."

"But what happened to the 8.17-year cycle?" asked Robert.

"What seems to be true is that during the latter two thirds of the rail stock price series the 7.95-year cycle and the 8.36-year cycle merged to create an 8.17-year cycle—a cycle with a length halfway between them. When we studied the *combined*

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series, which goes back only to 1871, we picked up this merged cycle. When we studied rail prices 1871 to date we get this 8.17-year cycle too. But when we went all the way back to 1831 we found that the two cycles—7.95- and 8.36-year—better describe what happened."

"If these two cycles merged 1871—1955 why didn't they merge 1831—1871?"

"During the period 1871—1955 they crest at more or less the same time and reinforced each other. During the period 1831—1871 they crested more or less out of step and offset each other."

"Do you find the 8.36-year cycle in other things?"

The 8.36-Year Cycle in Sunspots

"Yes, It's very clear in sunspots. In what other things, I can't say, offhand."

"When does the 8.36-year cycle crest?"

"In sunspots, according to Lane, it crests at 1954.75, in rail stock prices it crests at 1954.18, about 5 months later.

"That would seem logical."

"No, just the opposite. In sunspots the cycle should come *later*. U. S. A. economic data concentrate at about 40° north latitude, Sunspots are concentrated at latitude 40° to 0°—say an average of 20° As cycles crests seem to come later and later the closer you get to the equator, you'd expect the 8 1/3-year cycle in sunspots to come *after* the corresponding cycle of rail stock prices. I suspect that Lane may not have got rid of enough of his randoms and that the cycle on the sun really comes just a little later than he determined it. We'll find out someday!"

"If the 8.17-year cycle in rail stock prices is a blend of 7.95 and 8.36-year cycles, it ought to crest about halfway between them, shouldn't it?"

The 8.17-Year Cycle a Blend

"Yes, and it does. In rail stock prices the 7.95-year cycle crests ideally at 1952.9; the 8.36-year cycle crests ideally at 1954.18, about a year and a quarter later. The 8.17-year cycle in rails crests ideally at 1953.5—just halfway between."

"Let's see if I have this thing right." said Robert. "Rail stock prices act as if they were influenced by two regular cyclic forces one of which is 7.95 years long and the other of which is 8.36 years long. These cycles offset each other in the early part of the series. These cycles now combine to create a 8.17-year effect."

"Yes, that's it."

"And I suppose they will pull apart again?"

"Yes. By the year 2000 the 8.17-year cycle should again vanish."

"How do you *know* there are two cyclic forces? Couldn't the fadeout in the early years be due to something else? What I mean is, couldn't you say that there was an 8.17-year cycle from 1871 to date and that prior to 1871 it just wasn't there?"

"Yes, and that may be the true explanation. We don't *know* that rail stock prices are influenced by the two cycles interacting. We couldn't be sure of this unless we had many more years of figures and could see the 8.17-year cycle come and go, come and go, for a number of times. However, the two cycles explain the known facts of rail price behavior and also, they exist separately in other phenomena."

The 8.17-Year Cycle Found in European Weather

"Do you find the 8.17-year cycle in other things?" asked Robert.

"Yes, Brunt found it in European weather but whether what he found was really an 8.17-year cycle or a merging of 7.95 and 8.36-year cycles, I don't know."

"There's a lot to check into, isn't there?"

"Yes."

"Now," said Robert, "will you start at the beginning and tell me in detail all about each of these 8-year cycles?"

"I'd be glad to," I answered, "but it's getting pretty late. What do you say we pass it up until our next meeting. Maybe by then I'll have had time to find out a little more about some of them than I now know."

"Fine." said Robert. *E.R.D.*

How it Came Out

THE 8-YEAR CYCLE IN CIGARETTE PRODUCTION, 1880—1955

THE 8-year cycle in cigarette production, 1880 through 1955, has repeated nine times in the figures available for study.

Cycle Came True After Discovery

One of these nine times was after discovery. When you have a cycle come true *after* discovery it is *much* more important than when you find a cycle present in past figures. You see, when you look for a cycle in past figures it can be of any length. You have hundreds of possible lengths to choose from. But when the cycle comes true in after-unfolded figures it has to be of one particular length—the length you found in the past figures. That is why even one single wave coming true after discovery is usually much more meaningful than eight or ten waves in purely historical figures.

Growth of the cigarette industry has been fantastic. It runs from 533 million cigarettes in 1880 to 412,000 million cigarettes at the present time. This is an increase of nearly 800 fold.

Compound Growth

Growth has been compound. Compound growth results when an industry has a "rebirth." Other examples of compound growth are copper production (rebirth in 1883 coinciding with the beginning of the electrical industry); the carriage industry (rebirth in 1900 coinciding with the installation of motors in carriages); the petroleum industry (rebirth in 1900 coinciding with change in demand from illuminating oil to gasoline.).

(For a full discussion of growth trends including growth history of some 26 different U. S. A. industries, see *Cycles* for December 1955.)

Two Rebirths

Growth of the cigarette industry has been charted in Fig. 1. The three stage growth trend is shown by a broken line. I do not know what caused the two rebirths. If I had to hazard a guess I'd say advertising caused the first one; smoking by women the second. Growth is again stabilizing. How the cigarette industry will effect another rebirth is hard to imagine. Perhaps their hucksters will convince us that, for the sake of their health, children should inhale the salubious aromas. ("Vitaminized cigarettes") What a market! After that what? Dogs? Who knows?

The 8-Year Cycle

The 8-year cycle of course wraps around the trend. As the variation in cigarette sales from year to year is relatively small the strengths of the 8-year cycle, percentagewise, is rather small also. It has, typically, a strength of 6.1% above trend at ideal time of crest, 6.1% below trend at ideal time of trough. Crests come ideally at 1920.5 and at 8 years forward and backward from that time. This puts the low of the ideal cycle at 1956.5 and the next crest, ideally, at 1960.5.

A cycle slightly less than 8 years fits the behavior better than a perfectly regular 8.0-year cycle. I suspect that the true length of this cycle is the well known length of 7.95 years.

The Future

As far as an outsider can tell from a knowledge of the 8-year cycle, cigarette production should go up for the next four years or so.

E.R.D.

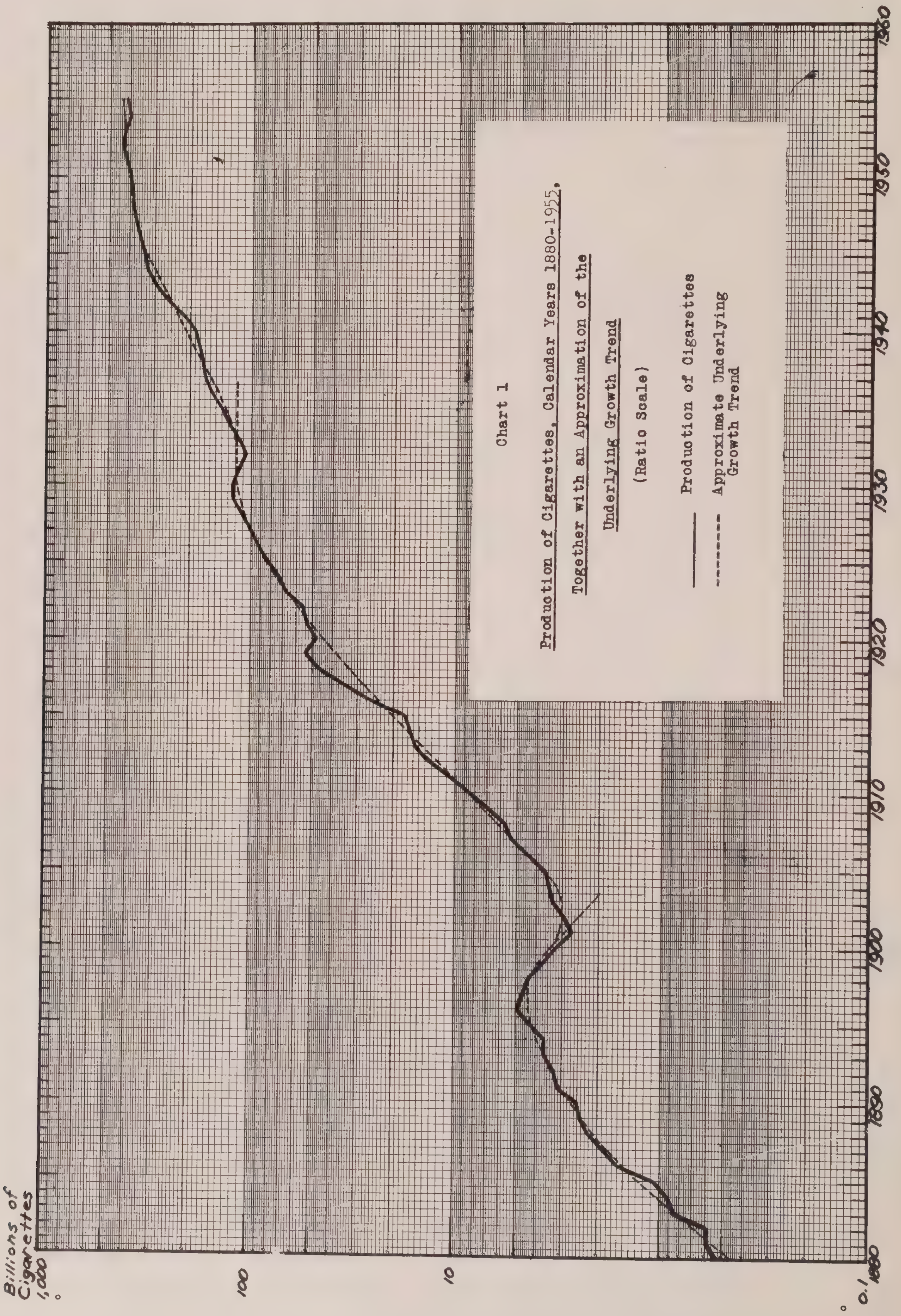

Chart 1

Production of Cigarettes, Calendar Years 1880-1955, Together with an Approximation of the Underlying Growth Trend

(Ratio Scale)

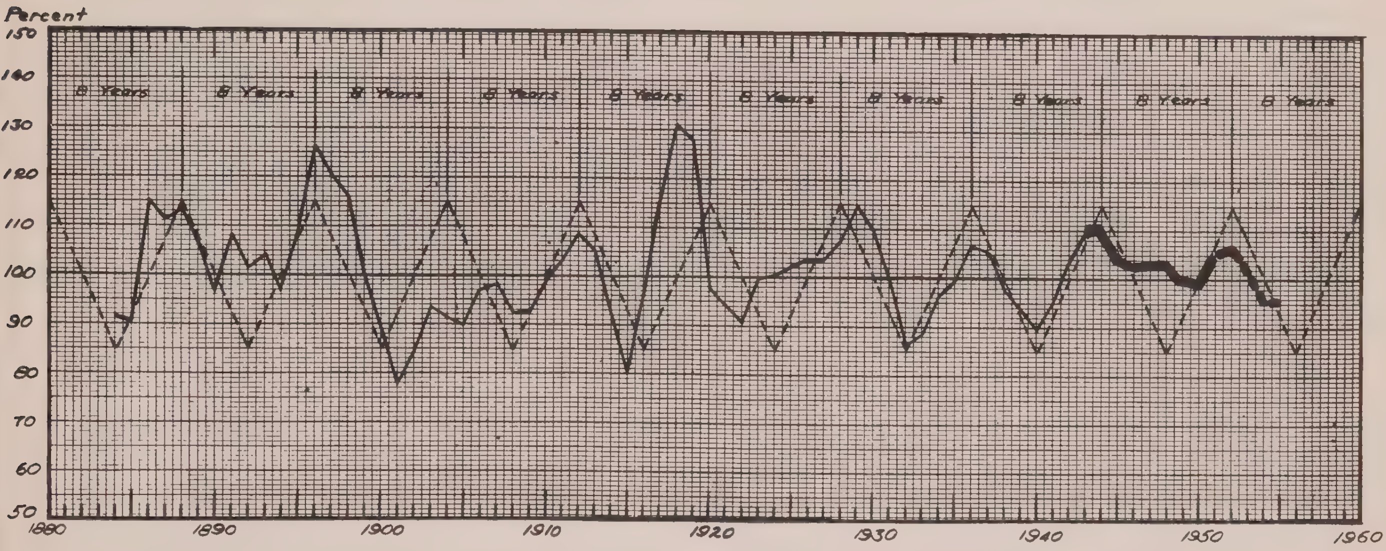

Chart 2

The 8-Year Cycle in Cigarette Production, 1880—1955
After Adjustment for a 9-Year Geometric Moving Average Trend

The 8-year cycle has been added by means of a broken line. This cycle was first determined in 1949 with figures available through 1943 (the 9-year moving average trend loses four years at the end of each series).

The heavy black line, 1943 through 1951, shows how the cycle has unfolded during the subsequent years.

The heavy broken line, 1951—1955, shows departures from estimated trend. In the future, when trend is known more accurately, these values can be revised.

TABLE 1

PRODUCTION OF CIGARETTES# U.S.A., 1880—1955

YEAR	PROD. (000,000 OMITTED)	YEAR	PROD. (000,000 OMITTED)	YEAR	PROD. (000,000 OMITTED)	YEAR	PROD. (000,000 OMITTED)	YEAR	PROD. (000,000 OMITTED)
1880	532.7	1896	4,967	1912	13,167	1928	108,710	1944	323,600
1881	594.6	1897	4,632	1913	15,556	1929	122,390	1945	332,200
1882	598.8	1898	4,384	1914	16,856	1930	123,800	1946	350,000
1883	844.0	1899	3,742	1915	17,964	1931	117,100	1947	369,700
1884	920.3	1900	3,254	1916	25,290	1932	106,600	1948	386,800
1885	1,079.5	1901	2,723	1917	35,331	1933	114,900	1949	385,000
1886	1,607.3	1902	2,961	1918	46,657	1934	130,000	1950	392,000
1887	1,865.3	1903	3,360	1919	53,120	1935	140,000	1951	418,800
1888	2,211.9	1904	3,427	1920	47,430	1936	158,900	1952	435,600
1889	2,413.3	1905	3,667	1921	52,090	1937	170,000	1953	423,100
1890	2,505.2	1906	4,501	1922	55,760	1938	171,700	1954	401,800
1891	3,137.3	1907	5,256	1923	66,720	1939	180,700	1955	412,500
1892	3,282	1908	5,743	1924	72,710	1940	189,400		
1893	3,661	1909	6,819	1925	82,250	1941	217,900		
1894	3,621	1910	8,644	1926	92,100	1942	257,500		
1895	4,238	1911	10,469	1927	99,810	1943	296,200		

#ALL CIGARETTES PRIOR TO 1898: CIGARETTES WEIGHING LESS THAN 3# PER 1,000, 1898 TO DATE.

*PRELIMINARY

SOURCE: AMERICAN TOBACCO COMPANY AND COLLECTOR OF INTERNAL REVENUE

THE 8-YEAR CYCLE IN GOODYEAR TIRE AND RUBBER COMPANY SALES
1926—1955

THE Goodyear Tire and Rubber Company net sales, 1926 through 1955, have been characterized by four important waves, each about 8 years long. This fact can be seen by looking at Fig. 1 on the next page, which charts these sales.

The Trend

Fig. 1 also shows by means of a broken line the 7-year moving average trend of these figures. A 7-year moving average trend is a curve which smoothes out the minor fluctuations and shows you the main structure of the curve more clearly. Such a moving average is merely a series of overlapping averages. Thus, the value of the 7-year moving average trend for the year 1929 is merely the average of the actual sales, 1926 through 1932; the value of this trend for 1930 is the average of the actual sales 1927 through 1933; and so on. A moving average is very simple to compute and to understand. Values of trend for the first and last three years are of necessity estimated. They are shown by a dotted line.

The 8-Year Cycle

Figure 2 shows the percentages by which sales have been above or below trend. Where the trend had to be estimated these values are shown by a broken line.

The typical 8-year wave in Goodyear Tire and Rubber Company net sales, 1926 through 1955, has the usual zigzag shape. It has a typical strength of 24.4% above trend at ideal time of crest, 24.4% below trend at ideal time of trough. The ideal time of crest is 1952.75 and every eight years forward and backward from that date. Troughs come ideally four years after crests. The date of the next crest is, *ideally*, 1960.75

How It Came Out

The heavy black line in Fig. 2 shows how these percentages above and below trend have behaved since discovery. Except for 1955 the behavior has been excellent. However, in judging how it came out, discount the percentage values for 1950, 1951, and 1952, as the actual values for these years were known and the percentages above trend could have been more or less guessed at when the original work was done in 1953.

There is no question but that there is an 8-year cycle in these figures—you can see it for yourself. It is diagrammed for you in Fig. 2 by means of a thin broken line.

Significance

The 8-year cycle in these figures is an unquestioned fact, but is it there purely as a result of accident? It could easily be. For my part I like to see at least ten repetitions of a cycle before I put much faith in its continuation. Fifteen repetitions makes me much happier than ten.--But Goodyear figures are not available prior to 1926. We must make do with what we have.

If four waves don't give us much to go on, why bother to record the fact? Several reasons: First of all, although four waves do not give us much to go on, they give us a little, and in trying to outguess the future, every little helps. Second, the weight given to the Goodyear cycle is increased by the fact that there is an 8-year cycle in other things where we have more figures. For example, in cigarette production from 1880 to date, this 8-year cycle has had a chance to repeat nine times and it has done so. Moreover, the Goodyear cycle has its crests and troughs at approximately the same time as the 8-year cycle in cigarettes. If it were accidental there is only one chance in eight that they would both fall in the same year. Third, it's always a good plan to note any cycle, wherever you find it, because a cycle which comes true *after* discovery is much (maybe 50 times) as likely to be significant as one you find in past figures.

For myself, I would rely only lightly on this 8-year cycle in Goodyear. However, I do feel it is very much worth watching.

E.R.D.

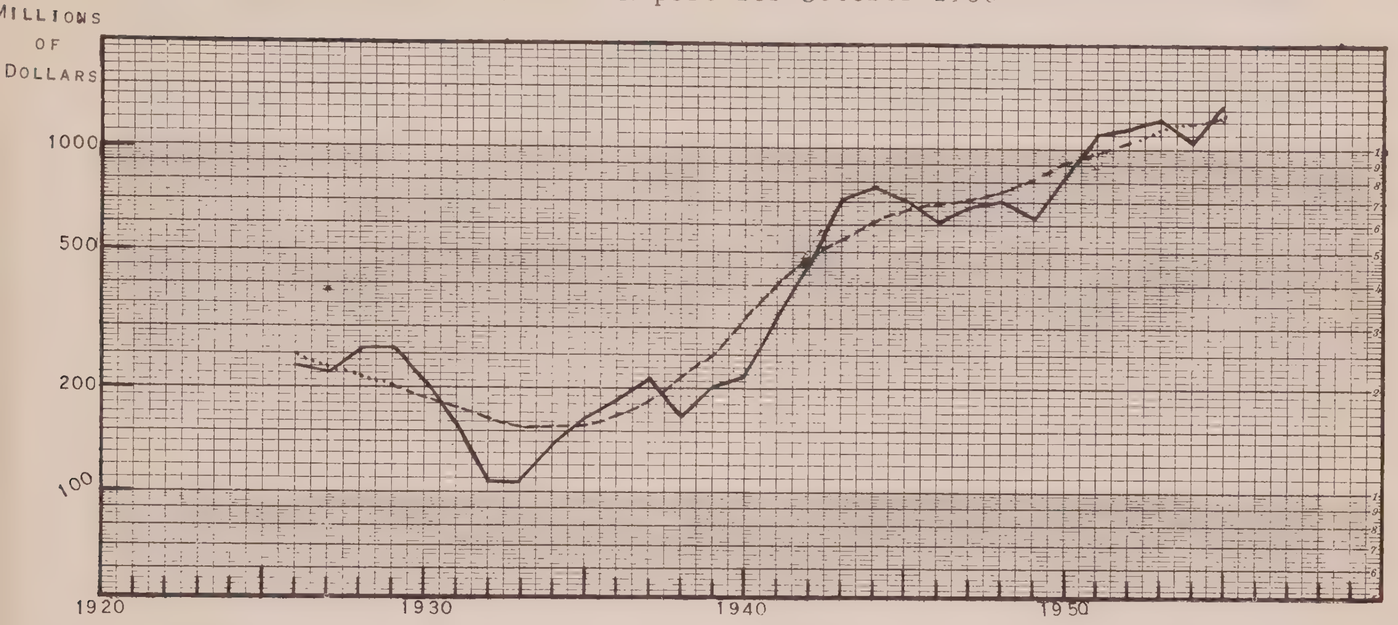

FIG. 1. GOODYEAR TIRE AND RUBBER NET SALES, 1926--1955.

The broken line shows a seven-year moving average trend, first and last four years estimated. Ratio Scale.

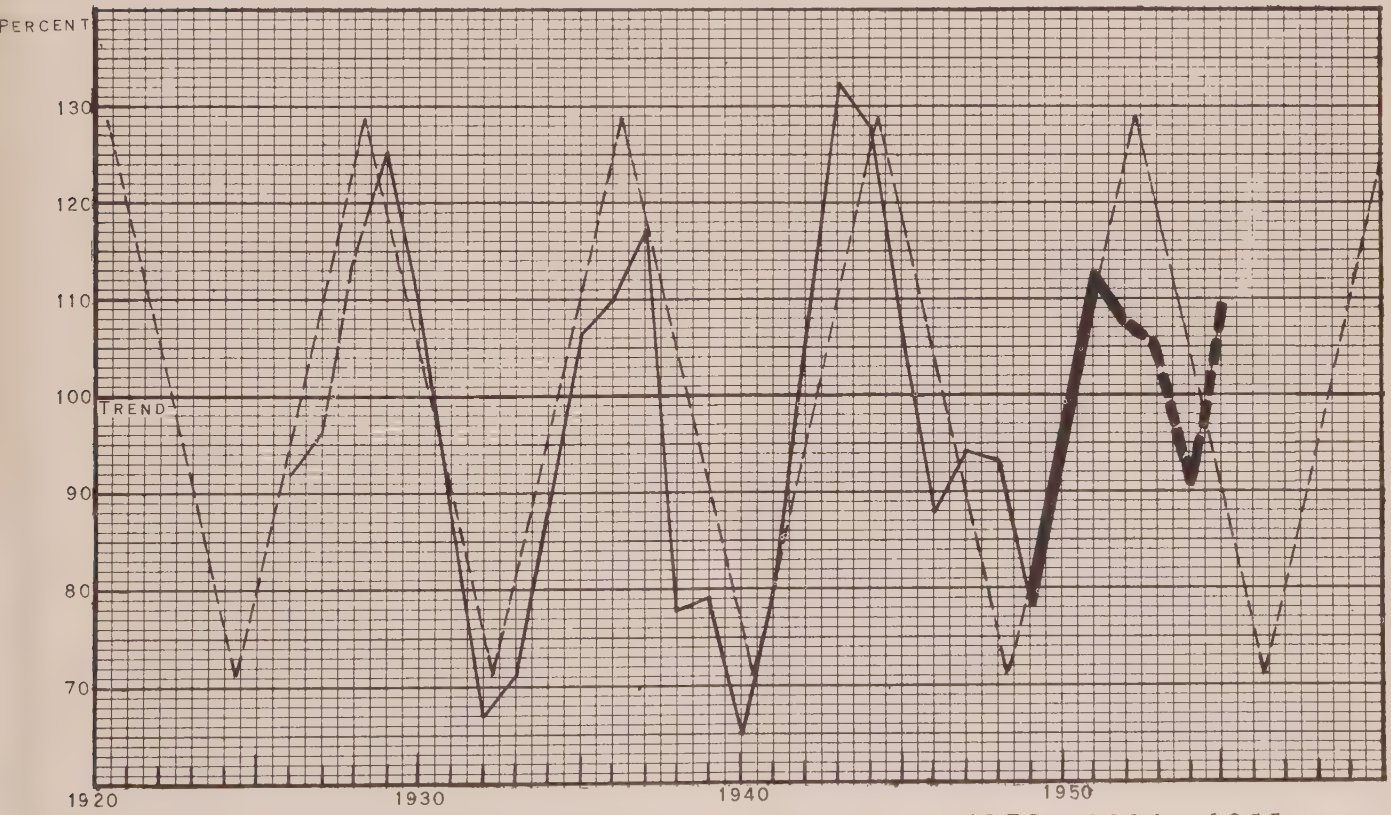

FIG. 2. GOODYEAR TIRE AND RUBBER NET SALES, 1926—1955.

The solid line shows the percentages that sales are of trend.
Heavy line shows how cycle has unfolded since discovery. The zigzag line diagrams a perfectly regular 8-year cycle. Ratio Scale.

THE MODIFIED GEISINGER INDICATOR

The Question

Gentlemen:

As a recent subscriber I would like to get some additional information that will allow me to more clearly understand your publication concerning "The Modified Geisinger Indicator of Industrial Production." Can you give me a little of the past history of this indicator curve, how was the name derived, and what figures are used from the "*Survey of Current Business*?"

The July issue takes this curve back to January, 1947, how long has this curve been used prior to that time? Thank you very much.

Very truly yours,
B............*

New Britain, Conn.

The Answer

Dear Mr. B.........*

I am glad to tell you all I can about the Modified Geisinger Indicator of Industrial Production.

Robert Geisinger, an industrial engineer, developed an indicator of industrial production which I first published in our report for August—September 1954. You will recall that the Federal Reserve Board Index of Industrial Production was at a bottom at this time. However, the Geisinger Indicator, projected, had been advancing for 8 months from its low in May of 1954. It thus suggested the upturn from mid 1954 to 1955 which followed in due course.

In explaining the Geisinger Indicator in the August—September 1954 issue, I said:

"In fairness to Mr. Geisinger I cannot reveal how this forecast curve is prepared. except to say that all the components are to be found in the *Survey of Current Business* and that their manipulation is logical and simple.

"The forecast curve uses limited data (see an article on limited data on page 252 of this [The August--September 1954] report). As a result it never goes above +6 or below -6. The forecast curve is thus merely a *directional* indicator. In the past, when the forecast curve has cut the lines +3 or -3, important moves of the Index of Industrial Production have followed. That is why I drew a special line for you at these values.

"The forecast curve takes cycles into account, but it is not a cycle projection."

I am sorry I am unable to tell you the components of the Geisinger Indicator, but I can say that they are well known and are logical forecasting series.

As far as I can recall Mr. Geisinger did not carry his computations back prior to January 1947, but I carried them back as far as possible. The Indicator proved of little value during the war. Prior to the war, certain of the components were not published and computation of the Indicator for these earlier years is therefore impossible.

I, myself, had developed and used to a certain extent another indicator which also had proved its usefulness. I published this indicator in our report for November 1954 and combined it with the Geisinger Indicator to create what I call the *Modified* Geisinger Indicator.

My indicator is merely the first differences of the Federal Reserve Board Index of Industrial Production smoothed by a centered 3-month moving average and a 2-month moving average advanced a half-month. I gave my indicator a weight of 2 and the Geisinger Indicator a weight of 1. It would, of course, be possible to carry *my* indicator back for as far as the Federal Reserve Board has issued monthly figures of industrial production.

I don't feel that the Modified Geisinger Indicator is infallible, but I do feel that it is definitely worth taking into account in connection with our efforts to outguess the future.

Ever cordially yours,
Director

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*WE NEVER PUBLISH NAMES WITHOUT PERMISSION.

TECHNICAL TERMS

The Question

Dear Mr. Dewey:

I believe it would be helpful to some of the less informed readers of *Cycles* if you published, occasionally, an explanation of trade talk such as "smoothed", "modified", and "moving average."

Very truly yours,
F.*

New York, New York

My Reply

Dear Mr. F.*

A line on a chart is called a **curve** no matter how jagged it is.

When a "curve" is very jagged the minor wiggles obscure the main structure. They bog it down with unnecessary details. When the statistician is interested in showing the main structure he usually **smoothes** the curve.

Smoothing

This smoothing process can be done in any one of a multitude of ways. The simplest way is freehand smoothing. This method consists of drawing a line by eye, more or less midway between the minor wiggles, in such a way as to clarify the main movements.

The trouble with smoothing graphically by eye is that it is subjective. It is liable to the criticism that the fellow who did the smoothing forced the pattern to prove a point. Therefore it is usually better to smooth a curve by some sort of objective method. There are many such methods but the simplest is the **moving average.**

Moving Averages

The moving average does arithmetically what the eye does graphically. Each point of a moving average is the average of the values of the curve for that particular point and a certain number of points on either side of it. Suppose for example you have a curve charting some monthly figures, 10, 12, 14, 7, 15, 17, 4, etc. as listed below. Suppose you decide to smooth by a 3-month moving average. You first average the 10, 12, and 14, to get an average: 12 (10 + 12 + 14 = 36; 36 ÷ 3 = 12). Then you average the 12, 14, and 7 to get a value of 11 (12 + 14 + 7 = 33; 33 ÷ 3 = 11) and so on, all as shown in the table below.

Computation of 3-Month Moving Averages of Monthly Data

Month	Data A	Moving Total B	Moving Average (1/3 of B) C
Jan.	10		
Feb.	12	36	12
Mar.	14	33	11
Apr.	7	36	12
May	15	39	13
June	17	36	12
July	4		
etc.	etc.	etc.	etc.

Compare the moving average (Col. C) with the data (Col. A). Note how much "smoother" the moving average is; that is, note how much less variation there is between successive items. Note that the moving average is posted (and plotted) in the middle of the numbers being averaged. Note also that no moving average values can be computed for the first and last points on your curve. (If you had chosen to average by 5's —a 5-month moving average--there would been no average values for the first *two* and the last *two* months. And so on).

For an answer to your questions about the word "modified," refer to my answer to the letter published above.

Cordially yours,
Director

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THE MODIFIED GEISINGER INDICATOR

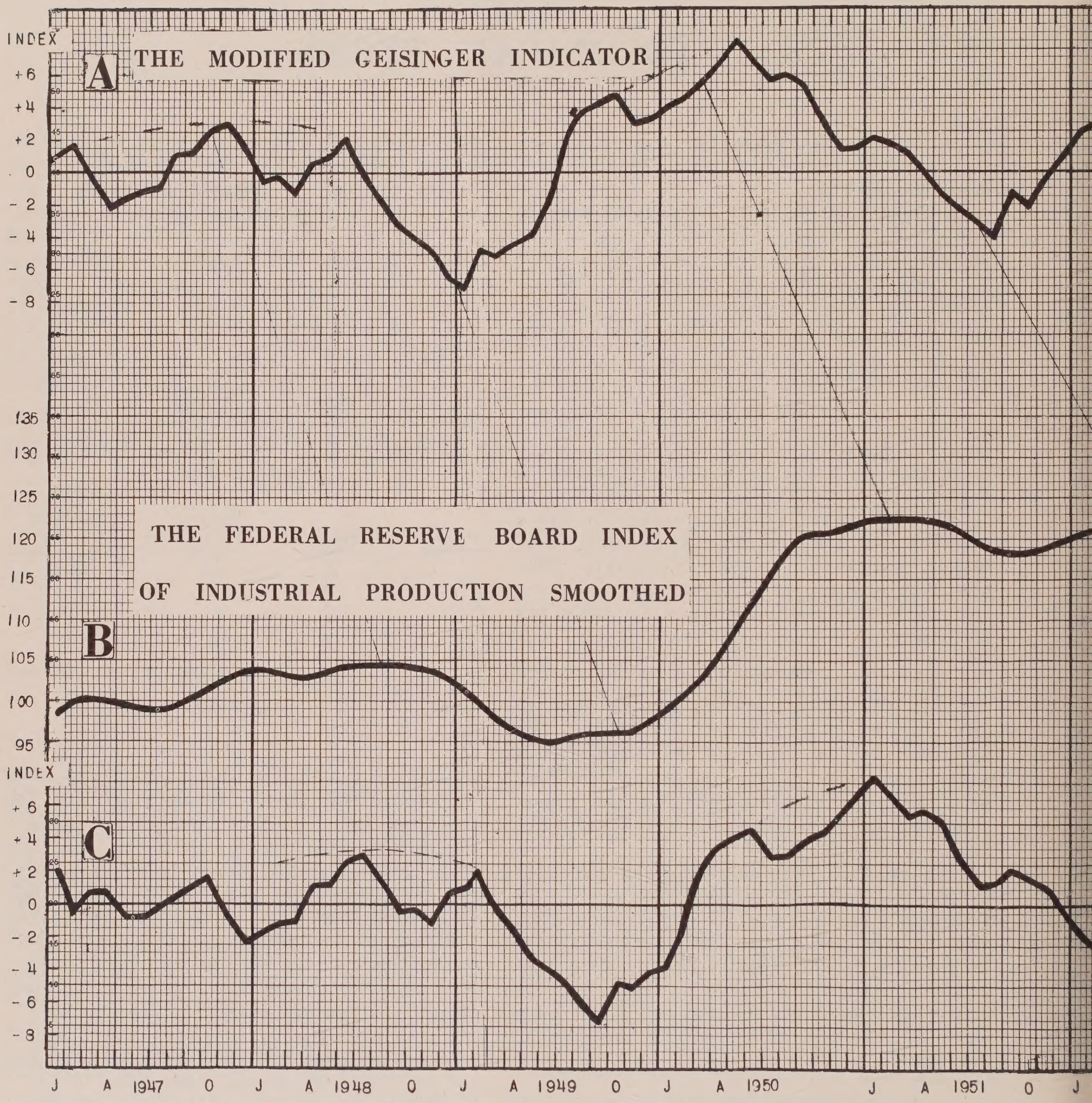
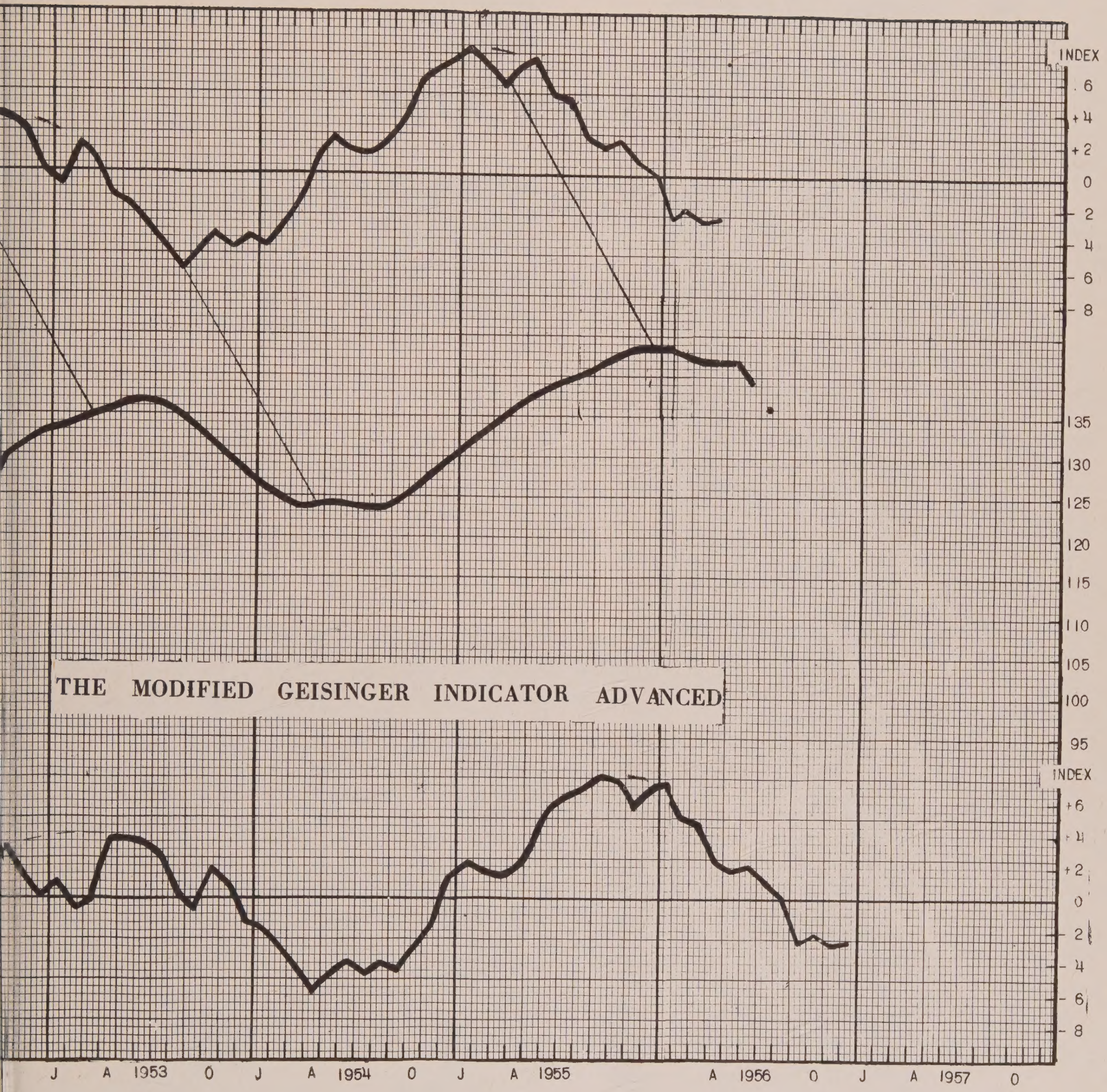


Fig. 1 Curve A. The Modified Geisinger Industrial Production Indicator Curve. This curve is derived from certain figures which are published monthly in the *Survey of Current Business*. It tends to turn about 8 months before the Federal Reserve Board Index of Industrial Production.

Curve B. The Federal Reserve Board Index of Industrial Production adjusted for seasonal variation and smoothed by a 3-month moving average. The value for the latest available month is shown by a dot.

Curve C. This curve is the Modified Geisinger Industrial Production Indicator Curve advanced by 8 months. This process projects part of the curve into the future. If the relationships of the past continue, the projection gives some hint of what may happen to the Federal Reserve Board Index of Industrial Production (Curve B).

OF INDUSTRIAL PRODUCTION



THE FORECAST

The Modified Geisinger Indicator of Industrial Production when projected, is -2.46 for December, up a trifle from a value of -2.84 for November.

The Federal Reserve Board Index, itself, is 1.36 for July compared to 1.41 for June. This dip in the index is largely due to the steel strike.

I have no comments in regard to next fall and winter in addition to those I have already made.

August 22, 1956

E.R.D.

Mr. H. A. Musham
741 No. Rush St.
Chicago, Ill.

GEISINGER INDICATOR

SPECIAL ADVANCE SERVICE

FOR THOSE WHO WISH IT

We plan a special service to give you the Modified Geisinger Indicator of Industrial Production about five weeks sooner than you are now getting it.

The figures that go into the Indicator become available about the 1st of the month Let's say June 1st 1956. This was too late to catch the July '56 report, which was already in the process of being printed. So it had to wait for the August report which went to the printer on Friday, July 13th. The August report was printed by Friday, July 27th. It was mailed Sunday July 29th. Uncle Sam then took a week or so to deliver it. The result of all this is a five week delay.

There is no particular reason why I could not send you, first class mail, on or about the first of each month, this Modified Geisinger Indicator figure as soon as it becomes available. It would of course be some extra work, some extra postage, some extra envelopes, some extra addressing etc., but I think all of this could be handled comfortably for $3 a year extra.

If you are interested, please send your check for this amount and we will put you on the list to receive this special service.

This service available to members only.

E.R.D.

FOUNDATION FOR THE STUDY OF CYCLES

680 WEST END AVENUE, NEW YORK 25, N. Y.